
Vehicle Occupancy Survey
US 52 – Harrison – SR 26 – US 231

October 28, 2003

Vehicle Occupancy Survey **US 52 – Harrison – SR 26 – US 231**

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On October 2, 2003, Staff from the Area Plan Commission conducted a vehicle occupancy survey at the four Wabash River bridges within Greater Lafayette/West Lafayette. These include the SR 26 Bridges, the Harrison Bridge, the US 52 Bridges, and the new US 231 Bridge. Counting each direction, staff began the survey at 6:45 a.m. and concluded at 8:30 a.m.

This is not the first occupancy survey conducted. The first was done on September 30, 1980. It wasn't until October 2 and 4, 1990 that staff looked at vehicle occupancy again. Following nearly the same time span, Staff observed vehicle occupancy again in 1999. Two years later, a fourth was conducted. In the first survey, only the Harrison and State Street bridges were observed. The latter three surveys included the US 52 Bridges.

This report consists of two parts. The first summarizes Staff findings from the October 2, 2003 observations and the second part compares these recent findings to those observed previously.

Since these observations were done during the morning rush hour, we can assume that nearly all vehicle occupants were traveling to work. Thus these occupancy rates reflect mostly work-related trips. It should be noted that work-related travel, to or from work, accounts for approximately 20 percent of all vehicle trips. The occupancy rate for the other 80 percent is much higher.

It should be noted that observers at the Harrison Bridge were unable to include or exclude vehicles entering and exiting the westbound ramps and eastbound on ramp. There were no safe locations on or near the Harrison Bridge for observers to view both vehicles and occupancy.

2003 Findings

During the period observed, Staff counted 11,353 cars, vans and pick-ups crossing the Wabash River. Those vehicles carried 12,579 persons, which translates to 1.11 persons per vehicle. The heaviest traffic observed was on US 52. Staff counted 3,267 vehicles with 3,584 persons. Nearly as equal, Staff observed 3,059 vehicles with 3,450 persons on the SR 26 Bridges. On the new US 231 Bridge, 2,822 vehicles carried 3,054 occupants. The Harrison Bridge carried the least amount of traffic, 2,209 vehicles with 2,491 occupants. Vehicle occupancy was identical on the Harrison and SR 26 Bridges at 1.13. There were slightly fewer occupants traveling the US 52 bridges, 1.10 person per vehicle. Vehicle occupancy dipped to 1.08 on the US 231 Bridge.

Directionally, it is evident that persons travel to work at Purdue. This becomes clear when considering the SR 26, Harrison, and US 231 Bridges. On SR 26, 1,883 vehicles traveled westbound while 1,176 vehicles traveled eastbound. Similarly, 1,407 vehicles traveled westbound on the Harrison Bridge while 798 traveled eastbound. The contrast is even greater on US 231. While 2,115 vehicles traveled northbound, only 707 traveled the opposite direction. Staff observed only a small difference on US 52. The number of vehicles traveling each direction were nearly equal with 1,630 eastbound and 1,637 westbound.

While more vehicles were traveling westbound and northbound, vehicles traveling the opposite direction had higher occupancies. Staff observed an average of 1.18 and 1.12 persons per vehicle traveling eastbound on the Harrison Bridge and southbound on the US 231 Bridge respectively. Strikingly opposite is the occupancy rate for vehicles traveling westbound and northbound. The rate was 1.10 on the Harrison Bridge and 1.07 on the US 231 Bridge. On US 52, the average occupancy reflected a similar pattern. The overall occupancy was 1.11 persons in eastbound vehicles and 1.08 persons in westbound vehicles. The SR 26 Bridges interestingly had the same occupancy rate for either direction, 1.13 persons per vehicle.

The peak 15-minute rush, or the largest volume of vehicles counted, occurred between 7:45 to 8:00. Motorists traveling northbound on US 231 experienced the heaviest traffic, 431 vehicles, during that peak period. Throughout nearly the entire survey, Staff observed more vehicles traveling northbound on US 231 than any other location.

The highest observed rate was 1.24 persons per vehicle traveling eastbound on the Harrison Bridge between 7:45 to 8:00. At the other extreme, the lowest rate was 1.03 persons per vehicle. This was observed on the eastbound SR 26 Bridge between 7:00 to 7:15. Looking further into the data, the highest observed occupancy rates were all found on the eastbound direction on the Harrison Bridge. The rate stayed consistently above 1.20 persons per vehicle between 7:30 to 8:15.

Historic Comparison

Since the first study, the average number of persons per vehicle has steadily declined. This recent survey shows that trend continues. In 1980, Staff observed an average of 1.24 persons per vehicle. Then in 1990, the average dropped significantly to 1.14. Nine years later the average declined, but only by a hundredth of an occupant (1.13 persons per vehicle.) That same rate of 1.13 was observed in 2001. Now the rate has dropped even lower to 1.11 persons per vehicle.

Interestingly, Staff observed nineteen fewer vehicles during this survey when compared to the previously one. This trend is quite opposite from the 1999 and 2001 surveys where Staff observed a thirty percent growth in traffic. The different trends could be contributed to the opening of the US 231 Bridge several months before the 2001 survey, the inability to safely observe vehicles and occupancy on the Harrison Bridge ramps or an overall stability in traffic volumes.

Over the last two decades, staff has consistently observed more vehicles traveling to West Lafayette than Lafayette on the SR 26, Harrison and US 231 Bridges. For every ten vehicles that crossed over the SR 26 Bridges, seven were traveling westbound. That ratio changed in 2001 and 2003 and now five out of eight vehicles travel to West Lafayette. To the north on the Harrison Bridge, Staff observed three out of five vehicles traveling westbound in 1980 and 1990. In 1999, 2001 and again in 2003, the ratio shifted to two out of three. Even on the new US 231 Bridge, Staff observed more vehicles traveling northbound toward West Lafayette. Six out of eight vehicles travel to West Lafayette. On US 52 however, the split is nearly even in the last four surveys.

Very little has changed over the past two decades regarding when morning rush “hour” peak occurred. In all five surveys, the peak was observed from 7:45 to 8:00 am.

Comparing occupancy rates by direction and fifteen-minute observation periods, the highest occupancy rates observed differed in each survey. In 1980, Staff observed a rate of 1.36 persons per vehicle between 7:45 and 8:00. Ten years later, the highest occupancy was observed between 7:30 and 7:45 with an average of 1.21 persons per vehicle. The highest rate observed in 1999 was 1.28 persons per vehicle. It occurred later than the previous two between 8:00 and 8:15. In the 2001 survey, Staff recorded the highest occupancy rate ever observed: 1.44 persons per vehicle. While the first three observations saw the highest occupancy rate in the eastbound direction on the SR 26 Bridge, the 2001 survey observed the highest rate on the southbound US 231 Bridge between 7:00 to 7:15. The location of highest occupancy observed in 2003 is different than the previous studies. Staff observed 1.24 persons per vehicle traveling eastbound on the Harrison Bridge between 7:45 to 8:00.

Conclusion

The trend to fewer occupants per vehicle unfortunately appears to be continuing. With the conclusion of the 2001 study, it appeared the trend of fewer occupants was leveling off at 1.13 persons per vehicle. However the 2003 survey found even fewer people are now sharing a ride to work. The average dropped to 1.11 persons per vehicle.

Over the last two decades, the peak 15-minute rush consistently occurred between 7:45 and 8:00. In 2003, all four bridges experienced the morning rush during this 15-minute period. The only exception was vehicles traveling southbound on US 231, the heaviest traffic occurred between 6:45 to 7:00.

Directionally, Staff consistently observed more vehicles traveling to West Lafayette on the SR 26 and Harrison Bridges in all four studies. This phenomenon was also observed on US 231 in the 2001 and 2003 surveys. Similar observations between the 1990, 1999, 2001 and 2003 surveys were noted on the US 52 Bridge. Nearly an equal number of vehicles traveled both directions.

Total One-Way

Location	Vehicle Count	Occupancy	Persons Per Vehicle
EB US 52	1,630	1,809	1.11
WB US 52	1,637	1,775	1.08
EB Harrison	798	944	1.18
WB Harrison	1,407	1,547	1.10
EB SR 26	1,176	1,329	1.13
WB SR 26	1,883	2,121	1.13
NB US 231	2,115	2,264	1.07
SB US 231	707	790	1.12

Total Two-Way

Location	Vehicle Count	Occupancy	Persons Per Vehicle
US 52	3,267	3,584	1.10
Harrison	2,205	2,491	1.13
SR 26	3,059	3,450	1.13
US 231	2,822	3,054	1.08

Overall Vehicle Occupancy

Vehicle Counts	Occupancy Count	Persons Per Vehicle
11,353	12,579	1.11

Historical Comparison – Number of Vehicles

	1980	1990	1999	2001	2003
<i>Harrison Bridge</i>					
Eastbound	1,083	1,560	969	904	798
Westbound	1,679	2,106	1,982	1,712	1,407
Total	2,762	3,666	2,951	2,616	2,205
<i>State Street Bridge (SR 26)</i>					
Eastbound	708	730	696	1,007	1,176
Westbound	1,715	1,809	1,663	1,843	1,883
Total	2,423	2,539	2,359	2,850	3,059
<i>US 52</i>					
Eastbound		1,256	1,562	1,763	1,630
Westbound		1,443	1,677	1,759	1,637
Total		2,699	3,239	3,519	3,267
<i>US 231</i>					
Eastbound				1,801	2,115
Westbound				586	707
Total				2,387	2,822
Total	5,185	8,904	8,549	11,372	11,353

Historical Comparison – Occupancy Rate

	1980	1990	1999	2001	2003
<i>Harrison Bridge</i>					
Eastbound	1.22	1.13	1.15	1.13	1.18
Westbound	1.24	1.12	1.11	1.10	1.10
Total	1.23	1.12	1.13	1.11	1.13
<i>State Street Bridge (SR 26)</i>					
Eastbound	1.27	1.17	1.19	1.18	1.13
Westbound	1.25	1.18	1.10	1.09	1.13
Total	1.26	1.18	1.13	1.12	1.13
<i>US 52</i>					
Eastbound		1.15	1.14	1.19	1.11
Westbound		1.13	1.13	1.13	1.08
Total		1.14	1.14	1.16	1.10
<i>US 231</i>					
Eastbound				1.07	1.07
Westbound				1.33	1.12
Total				1.13	1.08
Total	1.24	1.14	1.13	1.13	1.11

Modes Used by Route Direction

	Auto, Van, Truck	%	Bike	%	Motor- cycle	%	Bus, Truck	%	Peds	%	Total
<i>Eastbound</i>											
US 52	1,630	97.1					49	2.9			1,679
Harrison	798	96.0	1	0.1			13	1.6	19	2.3	831
SR 26	1,176	95.7	3	0.2	2	0.2	47	3.8	1	0.1	1,229
US 231	707	90.2					77	9.8			784
<i>Westbound</i>											
US 52	1,637	93.0			1	0.1	122	6.9			1,760
Harrison	1,407	96.8	7	0.5	2	0.1	37	2.5			1,453
SR 26	1,883	95.9	5	0.3	3	0.2	73	3.7			1,964
US 231	2,115	97.1					64	2.9			2,179
TOTAL	11,353	95.6	16	0.1	8	0.1	482	4.1	20	0.2	11,879

Modes Used by Route and Time

		Auto, Van, Truck	%	Bike	%	Motor- Cycle	%	Bus, Truck	%	Peds	%	Total
6:45	US 52	367	95.8					16	4.2			383
to	Harrison	203	95.3					7	3.3	3	1.4	213
7:00	SR 26	285	96.3	1	0.3	2	0.7	8	2.7			296
	US 231	382	96.7					13	3.3			395
7:00	US 52	354	95.6			1	0.3	14	3.8			369
to	Harrison	226	91.1					17	6.9	5	2.0	248
7:15	SR 26	387	95.6	1	0.2	1	0.2	16	4.0			405
	US 231	391	96.3					15	3.7			406
7:15	US 52	475	94.6					27	5.4			502
to	Harrison	300	95.5	3	1.0	1	0.3	7	2.2	3	1.0	314
7:30	SR 26	425	95.3	1	0.2	1	0.2	19	4.3			446
	US 231	414	95.4					20	4.6			434
7:30	US 52	540	95.6					25	4.4			565
to	Harrison	297	97.7					6	2.0	1	0.3	304
7:45	SR 26	453	96.4					17	3.6			470
	US 231	474	94.4					28	5.6			502
7:45	US 52	655	97.0					20	3.0			675
to	Harrison	507	98.3	1	0.2	1	0.2	4	0.8	3	0.6	516
8:00	SR 26	658	96.8	3	0.4			19	2.8			680
	US 231	533	95.3					26	4.7			559
8:00	US 52	450	93.0					34	7.0			484
to	Harrison	365	97.9					7	1.9	1	0.3	373
8:15	SR 26	449	95.3					22	4.7			471
	US 231	353	94.4					21	5.6			374
8:15	US 52	426	92.4					35	7.6			461
to	Harrison	307	97.2	4	1.3			2	0.6	3	0.9	316
8:30	SR 26	402	94.6	2	0.5	1	0.2	19	4.5	1	0.2	425
	US 231	275	93.9					18	6.1			293
	Total	11,353	95.6	16	0.1	8	0.1	482	4.1	20	0.2	11,879

		One-Way Vehicle Occupancy Count			Two-Way Vehicle Occupancy Count		
	Location	Vehicle Count	Occupancy Count	Persons Per Vehicle	Vehicle Count	Occupancy Count	Persons Per Vehicle
6:45	EB US 52	167	176	1.05	367	386	1.05
to	WB US 52	200	210	1.05			
7:00	EB Harrison	74	82	1.11	203	225	1.11
	WB Harrison	129	143	1.11			
	EB SR 26	110	124	1.13	285	323	1.13
	WB SR 26	175	199	1.14			
	NB US 231	244	256	1.05	382	408	1.07
	SB US 231	138	152	1.10			
7:00	EB US 52	167	189	1.13	354	399	1.13
to	WB US 52	187	210	1.12			
7:15	EB Harrison	76	84	1.11	226	249	1.10
	WB Harrison	150	165	1.10			
	EB SR 26	119	122	1.03	387	408	1.05
	WB SR 26	268	286	1.07			
	NB US 231	278	297	1.07	391	424	1.08
	SB US 231	113	127	1.12			
7:15	EB US 52	250	278	1.11	475	522	1.10
to	WB US 52	225	244	1.08			
7:30	EB Harrison	97	112	1.15	300	335	1.12
	WB Harrison	203	223	1.10			
	EB SR 26	162	181	1.12	425	480	1.13
	WB SR 26	263	299	1.14			
	NB US 231	314	345	1.10	414	463	1.12
	SB US 231	100	118	1.18			
7:30	EB US 52	315	360	1.14	540	610	1.13
to	WB US 52	225	250	1.11			
7:45	EB Harrison	117	143	1.22	297	349	1.18
	WB Harrison	180	206	1.14			
	EB SR 26	190	223	1.17	453	524	1.16
	WB SR 26	263	301	1.14			
	NB US 231	358	388	1.08	474	519	1.09
	SB US 231	116	131	1.13			

		One-Way Vehicle Occupancy Count			Two-Way Vehicle Occupancy Count		
	Location	Vehicle Count	Occupancy Count	Persons Per Vehicle	Vehicle Count	Occupancy Count	Persons Per Vehicle
7:45	EB US 52	314	343	1.09	655	709	1.08
to	WB US 52	341	366	1.07			
8:00	EB Harrison	202	250	1.24	507	574	1.13
	WB Harrison	305	324	1.06			
	EB SR 26	267	309	1.16	658	736	1.12
	WB SR 26	391	427	1.09			
	NB US 231	431	455	1.06	533	565	1.06
	SB US 231	102	110	1.08			
8:00	EB US 52	230	249	1.08	450	481	1.07
to	WB US 52	220	232	1.05			
8:15	EB Harrison	116	140	1.21	365	409	1.12
	WB Harrison	249	269	1.08			
	EB SR 26	179	202	1.13	449	519	1.16
	WB SR 26	270	317	1.17			
	NB US 231	285	308	1.08	353	379	1.07
	SB US 231	68	71	1.04			
8:15	EB US 52	187	214	1.14	426	477	1.12
to	WB US 52	239	263	1.10			
8:30	EB Harrison	116	133	1.15	307	350	1.14
	WB Harrison	191	217	1.14			
	EB SR 26	149	168	1.13	402	460	1.14
	WB SR 26	253	292	1.15			
	NB US 231	205	215	1.05	275	296	1.08
	SB US 231	70	81	1.16			

Auto, Van, Pick-up, Bus, Bicycle, Motorcycle and Pedestrian Data

Location		Occupant					Total	Bus, Truck	Bike	Motor- Cycle	Ped.
		1	2	3	4	5 +					
6:45	EB US 52	159	7	1			167	3			
to	WB US 52	190	10				200	13			
7:00	EB Harrison	66	8				74				3
	WB Harrison	117	11		1		129	7			
	EB SR 26	98	10	2			110	2		1	
	WB SR 26	156	15	3	1		175	6	1	1	
	NB US 231	232	12				244	8			
	SB US 231	125	12	1			138	5			
7:00	EB US 52	146	20	1			167	4			
to	WB US 52	165	21	1			187	10		1	
7:15	EB Harrison	69	6	1			76	3			5
	WB Harrison	135	15				150	14			
	EB SR 26	116	3				119	7	1	1	
	WB SR 26	250	18				268	9			
	NB US 231	259	19				278	9			
	SB US 231	99	14				113	6			
7:15	EB US 52	226	20	4			250	6			
to	WB US 52	208	15	2			225	21			
7:30	EB Harrison	84	12		1		97				3
	WB Harrison	185	16	2			203	7	3	1	
	EB SR 26	143	19				162	7	1		
	WB SR 26	231	29	2	1		263	12		1	
	NB US 231	286	25	3			314	11			
	SB US 231	88	8	3		1	100	9			
7:30	EB US 52	271	43	1			315	6			
to	WB US 52	203	19	3			225	19			
7:45	EB Harrison	99	13	2	3		117	2			1
	WB Harrison	158	18	4			180	4			
	EB SR 26	161	26	2	1		190	6			
	WB SR 26	229	30	4			263	11			
	NB US 231	328	30				358	13			
	SB US 231	105	9		2		116	15			

Auto, Van, Pick-up, Bus, Bicycle, Motorcycle and Pedestrian Data

Location		Occupant					Total	Bus, Truck	Bike	Motor- Cycle	Ped.
		1	2	3	4	5 +					
7:45	EB US 52	286	27	1			314	7			
to	WB US 52	319	20	1	1		341	13			
8:00	EB Harrison	165	26	11			202	2	1		3
	WB Harrison	286	19				305	2		1	
	EB SR 26	235	24	6	2		267	7	1		
	WB SR 26	356	34	1			391	12	2		
	NB US 231	407	24				431	10			
	SB US 231	94	8				102	16			
8:00	EB US 52	212	17	1			230	10			
to	WB US 52	208	12				220	24			
8:15	EB Harrison	99	10	7			116	5			1
	WB Harrison	229	20				249	2			
	EB SR 26	158	20		1		179	12			
	WB SR 26	230	35	3	2		270	10			
	NB US 231	264	20		1		285	9			
	SB US 231	65	3				68	12			
8:15	EB US 52	164	20	2	1		187	13			
to	WB US 52	215	24				239	22			
8:30	EB Harrison	99	17				116	1			3
	WB Harrison	171	16	2	2		191	1	4		
	EB SR 26	132	16		1		149	6			1
	WB SR 26	215	37	1			253	13	2	1	
	NB US 231	195	10				205	4			
	SB US 231	61	8		1		70	14			
	TOTAL	10,252	1,000	78	22	1	11,353	482	16	8	20